Operation manual

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Models and options:

References	Voltages	Models
MSA19.709	220 V	Machine without options and without baskets
MSA19.709-110	110 V	" " " " " "
MSA19.710	220 V	Machine without options and with baskets
MSA19.710-110	110 V	" " " " " "
	Baskets:	1x MSA19.569 / 3x 19.570 / 1x 19.571 / 1x 19.572

The following additional functions are available:

MSA19.710-A : Extended cleaning movements (OPT1)

Enabling this option, the degrees of rotation (right and left) of cleaning bath movements are adjustable individually in the "Settings" menu.
Example: instead of programming a full right turn and a full left turn, this option allows you to set a rotation of 30° to the right and 180° to the left.

MSA19.710-B : Vibrasonic (OPT2)

Enabling this option, the "VB" movement can be selected and customized in the settings. During this oscillating motion vibrating movement, it is possible to constrain the rotation angle to 36 degrees.

MSA19.710-C : Export memory SD-Card (OPT3)

Enabling this option, the machine logs all cleaning operations, with date, time, duration, used program and movements, as well as the current state of the used cleaning solutions.
A serial number is generated for each cleaning that appears after cleaning in the display. The information is written in a TXT file and stored in the SD-Card, which contains all the information.
To save files, a formatted SD-Card (FAT or FAT 32) can be used.

MSA19.710-D : Master/Slave (OPT4)

In this option, a relay is switched synchronous to the exhaust fan of the machine.
It can be used to connect external exhaust systems and control them with the machine.

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2. Introduction

Dear Customer,

Many thanks for purchasing this product. With the purchase of the Vibrato, you have acquired a fully automatic washing machine, for cleaning watch movements and movement parts with completely free programmable cleaning processes.
The machine offers the possibility to use 5 cleaning tanks and one ultrasonic tank, as well as a drying station in free programmable process.

Please keep this operation manual carefully.

3. The principle of ultrasound cleaning

The action of ultrasound in liquids is based on the **phenomenon of cavitation**: creation; growth and implosion of bubbles formed when a liquid is subjected to a pressure wave. This leads to a pressure shock around the bubble and the formation of a thermochemical micro-reactor inside the bubble.

In order for acoustic cavitation to take place, a power threshold must be reached. This threshold is around 0.5 W/cm² at 20 kHz for water at atmospheric pressure and around a few W/cm² for organic solvents. The amplitude of the depression to be supplied to reach the cavitation threshold depends on several parameters: the higher the viscosity of the media (therefore the internal cohesion of the liquid), the harder it is to achieve cavitation as the particles are more difficult to separate.

In liquids, acoustic cavitation causes power ultrasound effects.

Cleaning

If, as they develop, the cavitation bubbles come into contact with a solid surface, they implode on this surface by forming very violent microjets of liquid (100 m/s) which strip the solid surface.

To achieve the best quality cleaning and to adhere to the constraints of the application, **the following should be opted for:**

- An ultrasonic power of around 5 - 20 W / litre of bath liquid
- Ultrasonic frequency: 25 kHz (Powerful cleaning of hard and very dirty surfaces), 40 kHz (Fine cleaning of delicate surfaces), and 1 - 2 MHz for silicon wafer cleaning
- Detergent (neutral, acid or base) to encourage the dissolving of dirt without damaging the item to be cleaned
- Cleaning time ranging from a few seconds for a few hours for stripping degreasing

4. EC declaration of conformity

CE

This device complies with European standards (CE) according to 2006/42/EC directives.
A copy of the Declaration of Conformity can be provided on request.

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5. Safety instructions

To avoid malfunctions, damages or injuries, please take in account the following safety instructions of this machine.

- Make sure that the mains voltage corresponds to that indicated on the plate on the back of the machine. The equipment you have purchased may only be connected to a 230 V/ AC / 50 Hz mains socket or 110 V according to the standard of the country.
- Persons without proper instruction are not allowed to use the unit, unless they have received training under supervision of a certified consultant or service.
- The device is not suitable for being operated by children or untrained persons. Exclude all possibilities for unsupervised use by untrained and unauthorized persons.
- Ensure that during cleaning of the unit, the power switch is set to zero and the power cord is disconnected from the electricity network. Make also absolutely sure that during cleaning or maintenance work, the use of the unit by any other person is not possible.
- Make sure that the machine operates only in a well ventilated room or connected to an external exhaust.
- Take care when loading the machine not to damage any mechanical or electrical parts. When suspected damage of any kind, shut the machine down and please ensure that a further use by any other person is not possible.
- In case of damage of the machine, its use is strictly prohibited.
- When using cleaning fluids take care to use them according to the safety instructions of their respective manufacturers. Do not use any cleaning solutions that are not approved by us. Please inquire in case of doubt. Damage due to improper use of the substances is not subject to the liability of the manufacturer or the supplier of the cleaning fluids.
- Do not use explosive substances.
- Do not mix different cleaning fluids.

In case of damage or incident, please do not try to make own repair. Please contact a certified maintenance technician or the manufacturer.
Any attempt of unauthorized repair and without our writing approval, leads to void the warranty and manufacturer's liability.

6. Technical data

Device type	Vibrato
Voltage	230 V / AC / 50 Hz
Maximum power	600 W
Power connected to inactive channel	35 W
Ultrasonic frequency	40 kHz (with Sweep function ± 0.5 KHz)
Maximum power	50 W (adjustable from 0 to 100%)
Weight without packaging	71 kg
Weight with transport packing	102 kg
Size	480 x 480 x 760 mm
Country of origin	Germany

Specific technical shipping information:

Extracted air	Internal 80 mm
Suction force	26 m^3/h - free movement

Standard content of delivery:

Vibrato device, ready for connection
1 Piece of power cord with EURO plug
5 glass containers
1 ultrasound tank
5 wave-breakers
1 user manual
1 door handle with screw

7. Starting

Remove the transport packaging.

Carefully remove the transport packaging, by removing all the screws of the wooden box with a suitable tool. Remove the cover and then, individually, all the sides of the box.

The device is now in position on the transport base and can be raised.

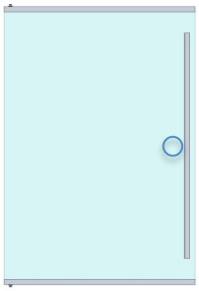
Setting up:

1. If the device is delivered in winter at very low temperatures, the formation of condensation can damage the electronics. In this case and before use, leave the device at room temperature for 24 hours to avoid any risk of damage.

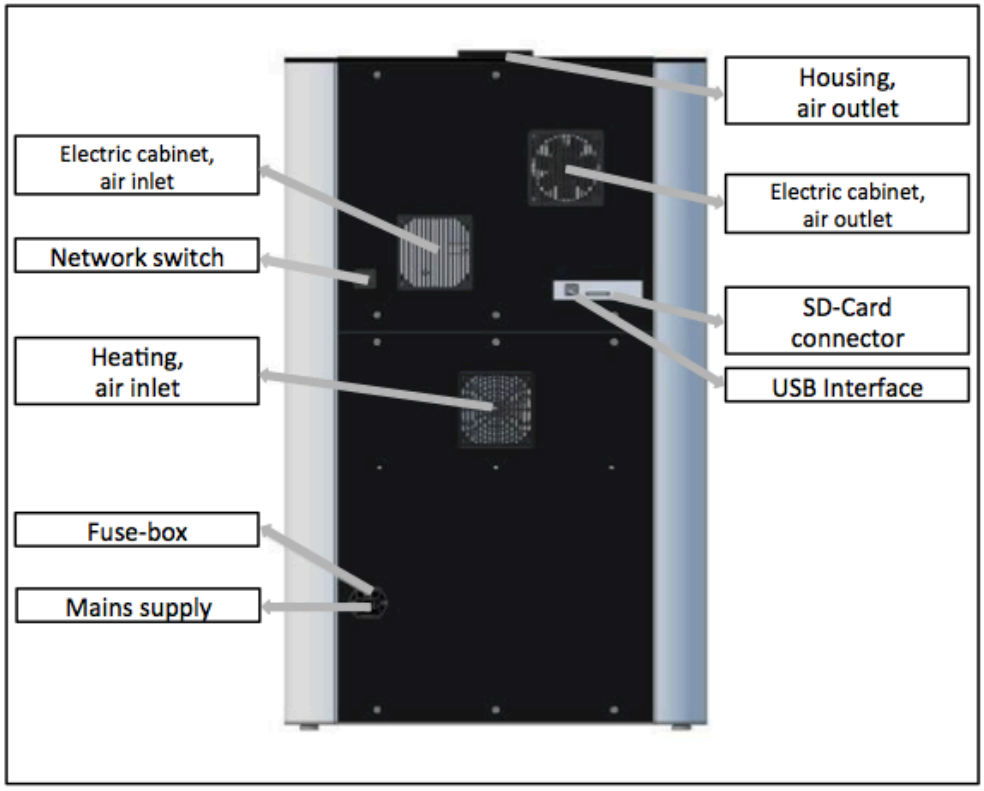
2. Place the device on a stable and flat surface. Turning the feet can level it.
Please ensure that the support has sufficient stability.

3. Remove carefully from the working area, any packaging and transport security materials, supporting the lid.

4. Fix the provided handle with the screw into the hole of the Plexiglas door.



Connections:



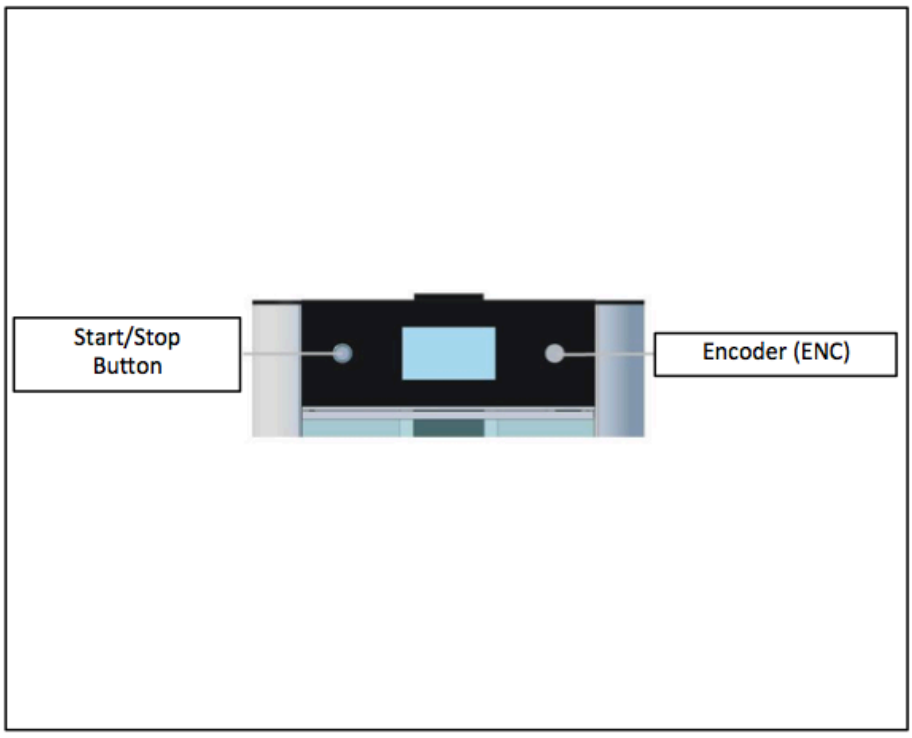
1. Connecting to the power supply: connect the supplied cable on the back of the unit and then connect the unit to the power supply. **Be sure that the power switch is in the "Off" position** when connecting the machine to the power supply.

2. Switch on the machine by pressing the **"On/Off"** switch to **"1"**. The unit performs a first self-test and starts the initialization. This means that all axes will go to the reference point to determine their current position. This process is repeated at each starting as well after each changing of the cleaning baths.

3. The machine is now ready for use and one can start preparing the cleaning baths.

8. Operation

The operating concept of the Vibrato is intuitive. All functions can be executed using only two controls.



On the left of the display is the [**Start/Stop**] button, which is used to start or stop a cleaning program.

The rotary encoder with confirmation function is located on the right of the display. This turning knob can be turned and pressed to confirm inputs [ENC]. With this control one can navigate in the menu, modify or confirm settings and entering numbers and letters.

Using ENC, one can move the cursor in the display. The cursor looks like two brackets around the value to be modified. **[Value]**
To change a value, press briefly on the ENC, which changes the brackets around the value **[Value]**. Turning the ENC can now change the value itself.

To confirm, press again on the ENC and the new value is entered. The brackets will change **[Value]** and can be moved again on the screen by turning ENC.

Return to the previous menu by clicking on the arrow on the upper right side. Returning by the arrow, the modified values are automatically saved.

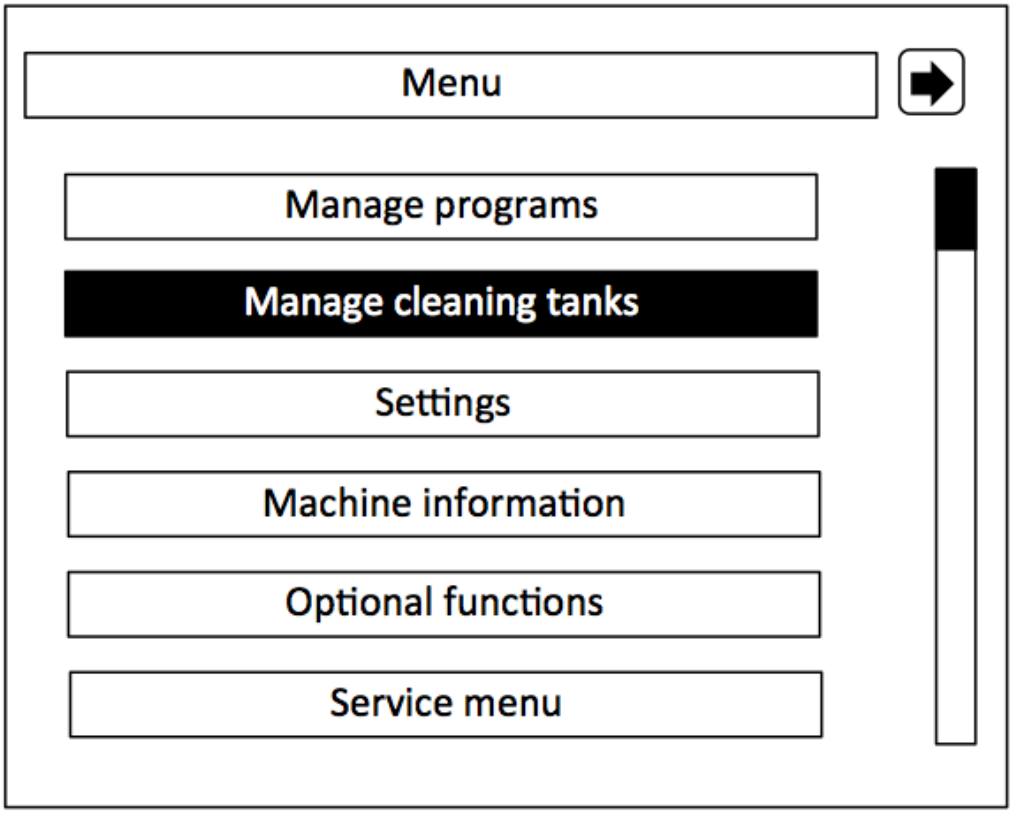
Letters and numbers can be entered for naming baths or programs. The cursor must be on the desired position and the character confirmed by pressing ENC. Continue this until the full name is entered. Note that the length of the text is limited in number of characters.

9. Equipment

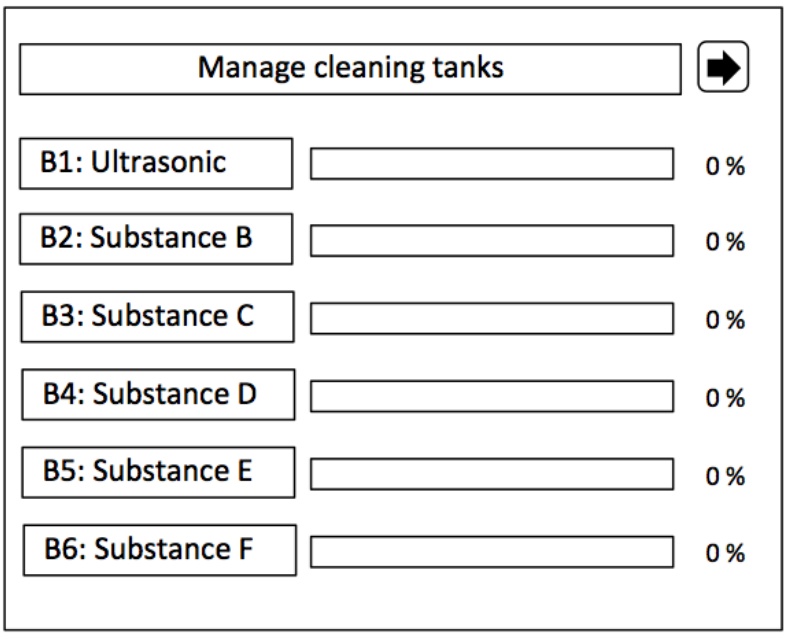
1. It is strongly recommended to insert the wave-breakers into the glass tanks. Bend the stainless steel alloy mesh circular (not too narrow) so that it fits with some tension in the glass tank. Verify that the cleaning basket can rotate freely. The wave-breakers placed in the tanks prevent rotation of the fluid.

2. Fill the tanks up to the mark with the desired cleaning fluid. Beware of the instructions for use-concerned fluids according to the instructions of the manufacturers.

Now, the tanks can be load into the machine. A setup is proposed in the menu, under which one can define the loading and designation of the tanks/fluids.



Go to the menu "**Manage cleaning tanks**" using the turning knob to the position "**Manage cleaning tanks**" in black and confirm the selection by pressing the ENC.

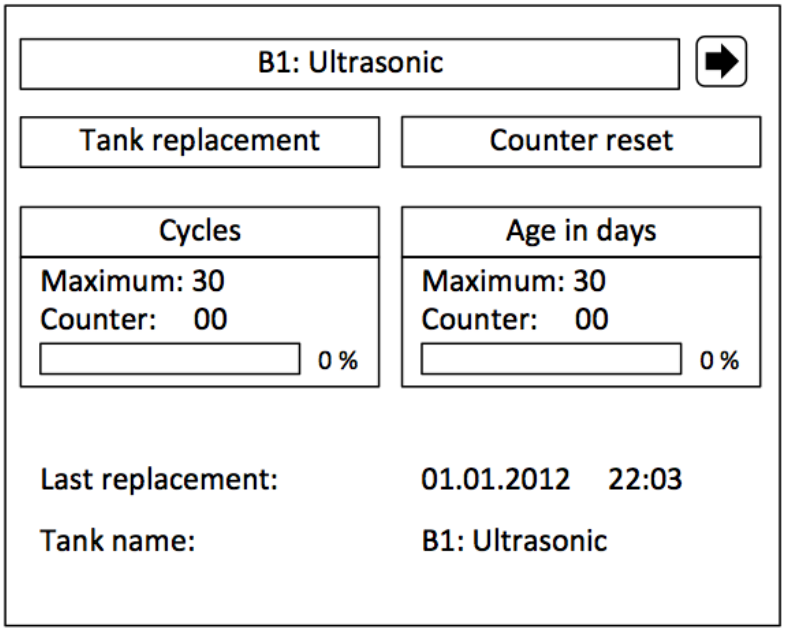


Here you can see the individual tanks B1 to B6 and right aside the associated name or the default name (substance A-F). These can be replaced while changing the tanks by your own names. It is advisable to enter the name of the fluid used during the cleaning.

The bath position identifies the position of the individual tank on the turntable and starts with the ultrasonic bath B1 (counter-clockwise). This allows the identification of the tank and its position on the turntable, which cannot be changed.

On the right side, you see a consumption bar showing the status of the used bath, if a maximum duration has been determinate.

Turn the ENC until the desired position, where should be placed the tank. Confirm the selection by pressing the ENC. Here the overview in detail of the bath.



With the function **[Change of tank]**, the chosen bath is placed facing the user to allow the changing. For safety reasons, the door must be kept closed. If not, the machine will ask its closure. In this position, a buzzer sounds, the door can be opened and the bath changed.

After the changing, the cursor automatically jumps on the function **[Reset of the counter]**, whereby both counters can be reset to zero. In the window **"Bath cycles"**, one can enter, under point **"Maximum"**, the maximum number of cleaning cycles that the bath can use. The using bar generates itself on the main screen. The counter takes also in account the previous uses.

In the window **"Age in days"**, one can set the maximum duration of use in days. Similar to the cleaning cycles, the consumption bar is generated since the last bath changing.

CAUTION : If for both **"Cleaning cycles"** and **"Age in days"** a maximum value is defined, the consumption bar displays the value that comes first to the limit or the one that is closest.

If during cleaning, the maximum use of a bath is reached, an indication appears after cleaning. After confirmation, the menu goes automatically to summary screen of the baths. Here it is possible to identify the bath which limit has been reached and change it.

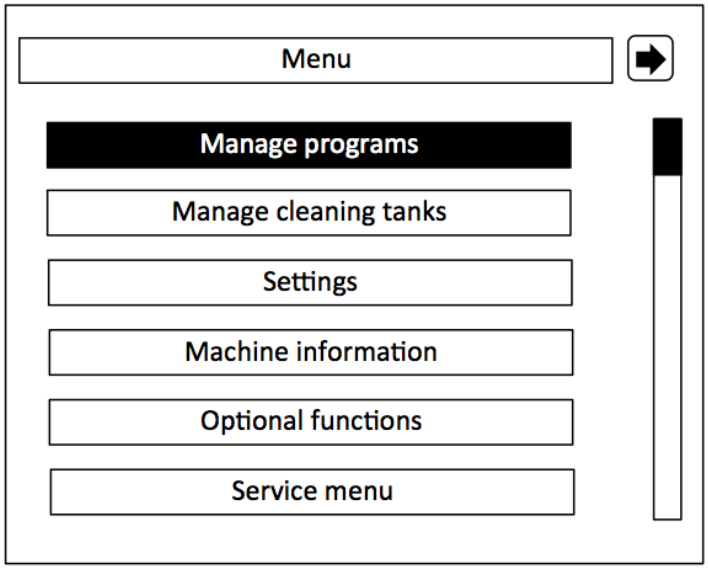
In the field **"Name of the bath"**, it is possible to name the bath with its cleaning fluid. The shortcut **"B1"** refers to the position 1 of the bath in the machine. If no name is entered, **"Name of the bath"** field will be blank and the default name appears (or only the position if the name has been deleted). Using the arrow at the top right, one can return to the overview of the baths, and according to the same principle, all positions of baths can be started, adjusted and changed.

After leaving the "Tank changing" menu, the machine performs a homing of the axis.

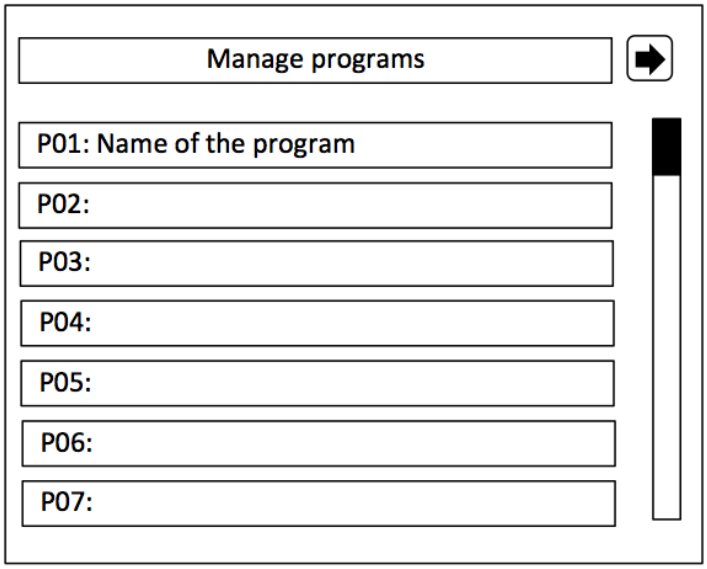
10. Creating cleaning programs

The machine is now equipped with tanks and fluids and one can prepare a cleansing program as needed.
Basically, a cleaning program - called **"Steps sequence"**- consists of individual cleaning **steps**. However, drying is considered as a single step and can be fitted into a cleaning program on every position.

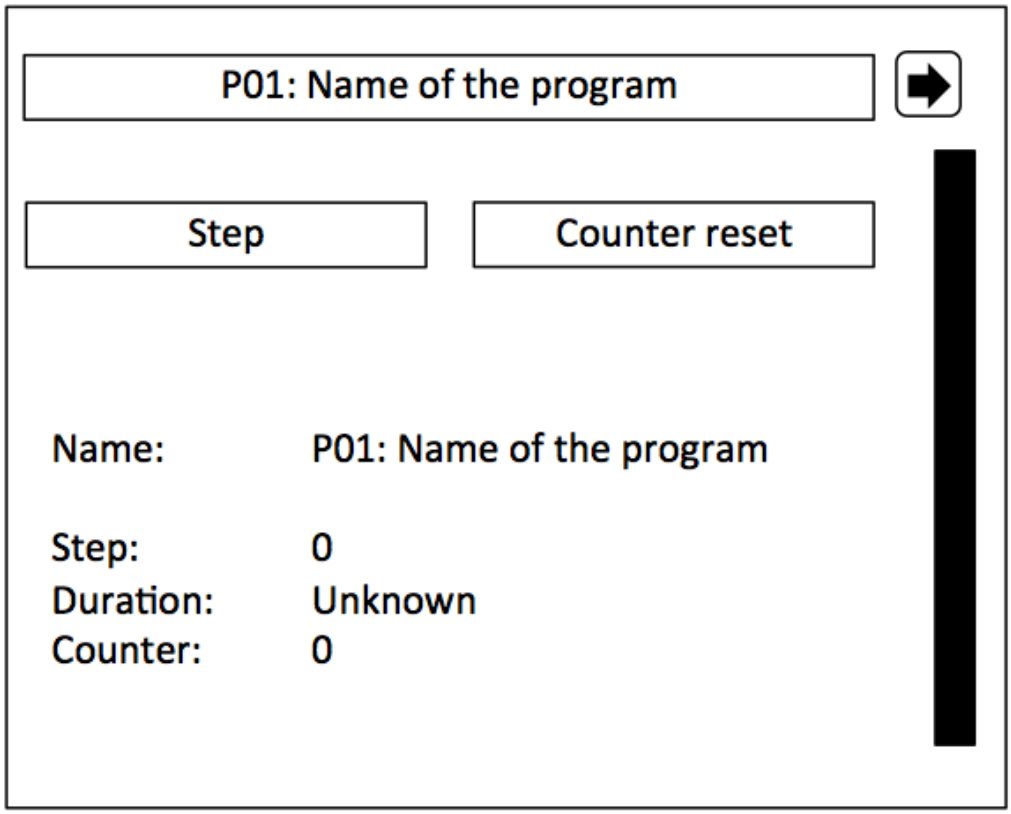
All the steps can be programmed in any order and are not related to the sequence of the baths in the machine. Similarly, individual tanks can be repeatedly used with different cleaning movements.
To create or change cleaning programs, first go to the main menu and select "Manage programs".



Choose the field **"Manage programs"** and confirm by pressing ENC.
Now the list of the programs is displayed. Here one can see the 32 storage places (P01 to P032) and also the designation of the program, if defined previously.



To create or change a program, select the corresponding storage place.
After confirmation, the overview of the selected storage space is displayed.



One can now move the cursor by turning the ENC and change the value by pressing on the appropriate location as described earlier in this guide.
In the field **"Name:"** it is advisable to enter a descriptive name to the program so that other users can easily identify the program.

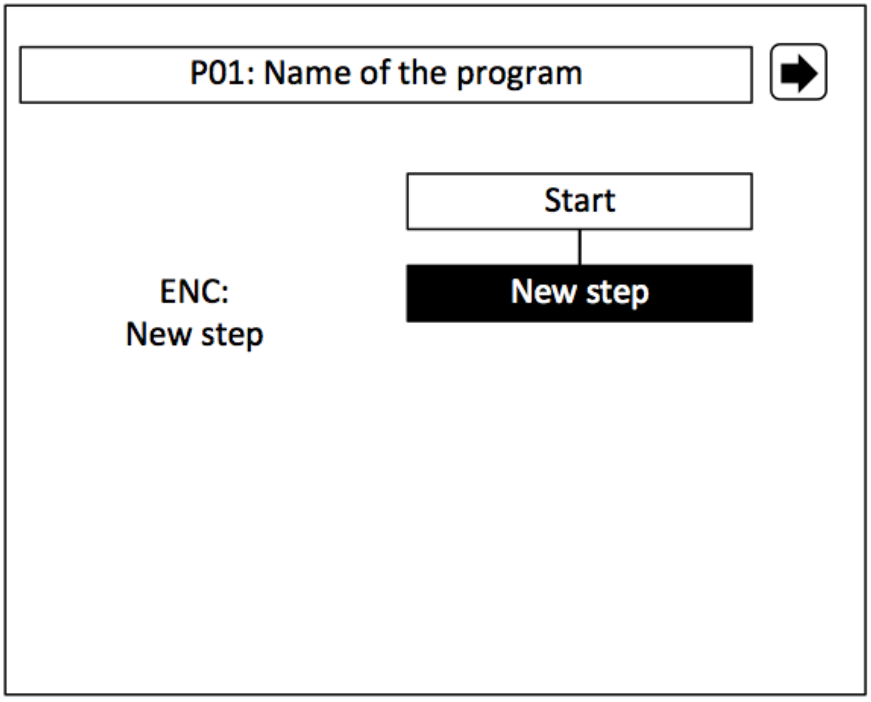
The input of letters is made by turning the ENC and confirmed by pressing on it.

"Step": shows the step number in the program. If no steps have been programmed, the number "0" appears.
"Duration": it is determined on the basis of different cleaning times in each bath, spinning and drying, times as well as the duration of the movements. As soon as a cleaning program has been completely executed, the machine calculates the duration of the movements and the total duration. It displays them immediately on numeric value and on the progress bar.
"Counter": it displays the number of uses of a program in memory.
"Counter reset": to reset the counter, select **[Counter reset]** and confirm by pressing on the ENC.
"Step": To create a step sequence - a sequence of various cleaning programs - select **[Step]** and confirm by pressing the ENC.

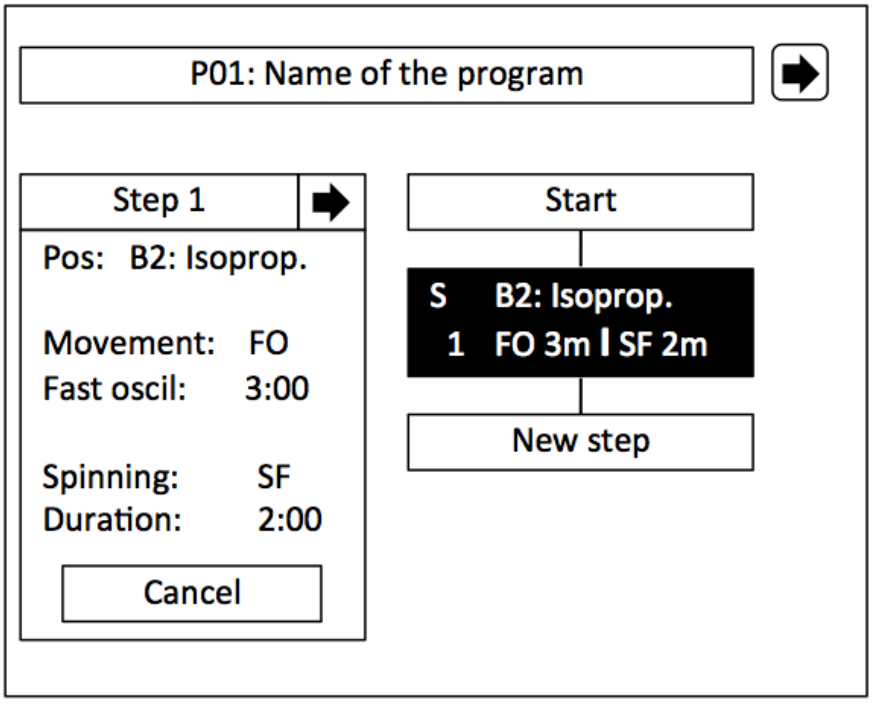
The name of the sequence of steps is selected here because during the cleaning program and the programming, the different steps are represented on the right of the display as a sequence from top to bottom.

Now one can see a blank steps sequence with **[Start]** and **[New step]**.
To create a cleaning step, select the field **[New step]** and confirm with the ENC. Left you see the statement on the menu.

It is also possible to insert a new step at any point of an existing program with the **START/STOP** button.



After confirmation, a new step is entered (shown left), whose parameters can be set as follow:



In this step, all standard values are pre-selected and adjustable. Turn the ENC until the field to be modified and press on the ENC to change its value.

The following parameters can be changed at any step:

"Pos": set the position of the bath. If some bath names are already programmed in the "Tank changing" menu, those names are displayed. Here, bath # 2 is named as **"Isoprop."**. By turning the ENC, one can choose the desired bath. The **"Drying"** function can be added as a single step at any time.

"Movement": define the movement of the basket in the cleaning solution. The speed of bath movements can be adjusted in the **"Settings"** menu (this will be explained later in this manual). The following movements are available: LD / SD / LW / SW / LO / SO / LX / SX /VB (optional).

"03:00": Setting the duration of the bath. This means how long the basket in movement lies in the cleaning fluid. In this example, 3:00 minutes have been selected.

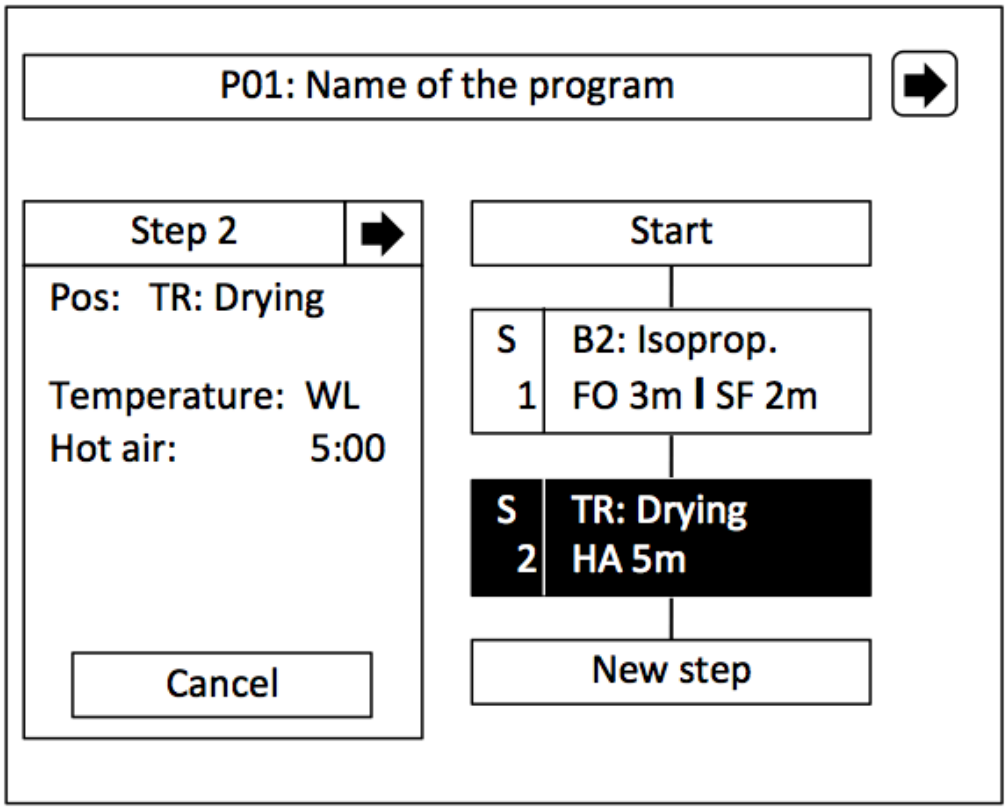
"Spinning": setting of the spinning after cleaning, its duration and rotation speed. The following options are available: ST / SL / SM / SS (this will be explained later in this manual).

"2:00": setting the duration of the spinning. In this example, 2:00 minutes have been selected. If "0:00" appears on the display, there will be no spinning.

With the function **[Cancel]**, the step displayed on the left can be deleted.

To confirm the settings of each step, move the cursor on the arrow **at the top right in the left window**, which returns to the programming of a new step.

The drying can be executed as a step anywhere in the process. To continue, select the point **"TR: drying"** on **"Pos"**:



Here the temperature can be adjusted: CA = cold air / WA = warm air / HA = hot air. These temperatures can be adjusted in the **"Settings"**. Selecting ST (Stop), the machine will only drain the basket without fan.
The duration of drying can also be adjusted. Note that the heating takes some time to reach the selected temperature. Also note that due to its inertia, stainless steel cools slowly.
After drying, the fan will run on to cool down the PTC heating element.

Please make a test run without any pieces after each temperature setting.

When all the cleaning cycle steps are performed, one can access to the summary of the program by moving the cursor over the arrow at the top right. The program is automatically saved and recorded.

Use of the ultrasound bath : on bath position # 1, the machine has an ultrasound bath with the "Sweep" function (frequency variation between 39.5 and 40.5 KHz). Its power can be adjusted directly from the cleaning menu, from 0% (OFF) to 100%. By moving the cursor to the bottom left, one can modify and confirm the value of the desired ultrasound power.

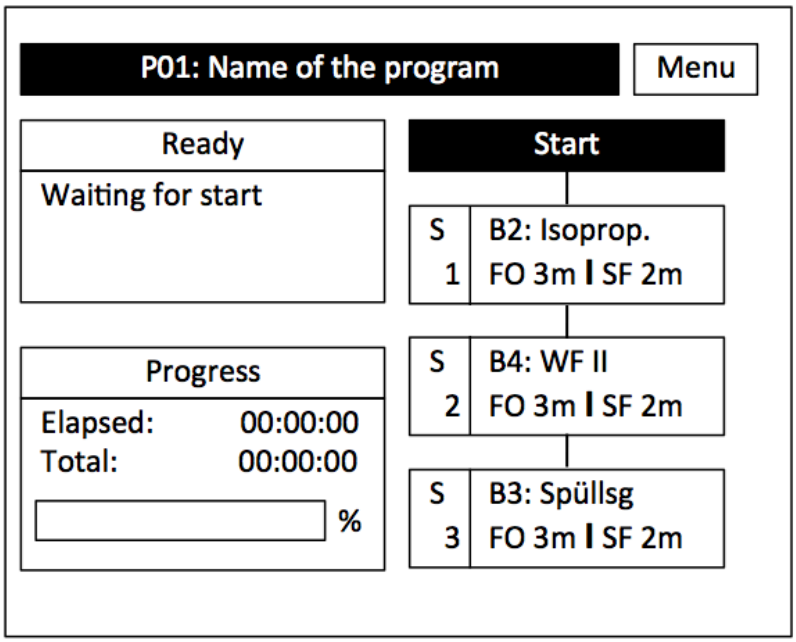
CAUTION : Never use the "Ultrasound" function with an empty tank.

The principle of ultrasound cleaning is explained on pages 4-5 of this manual (Chapter 3).

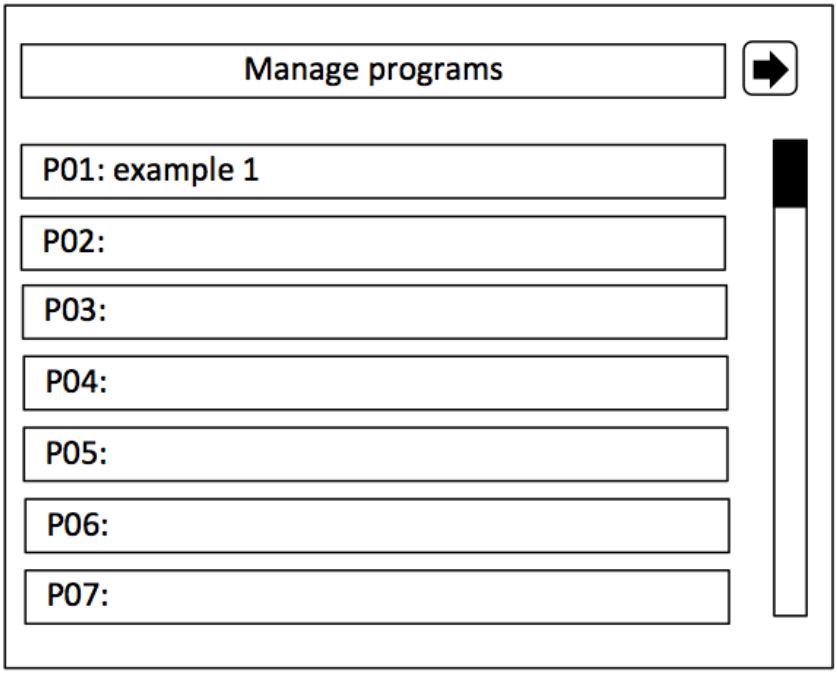
11. Performing cleaning programs

If a clean cycle has been saved, it is available in the list of programs and can be selected.

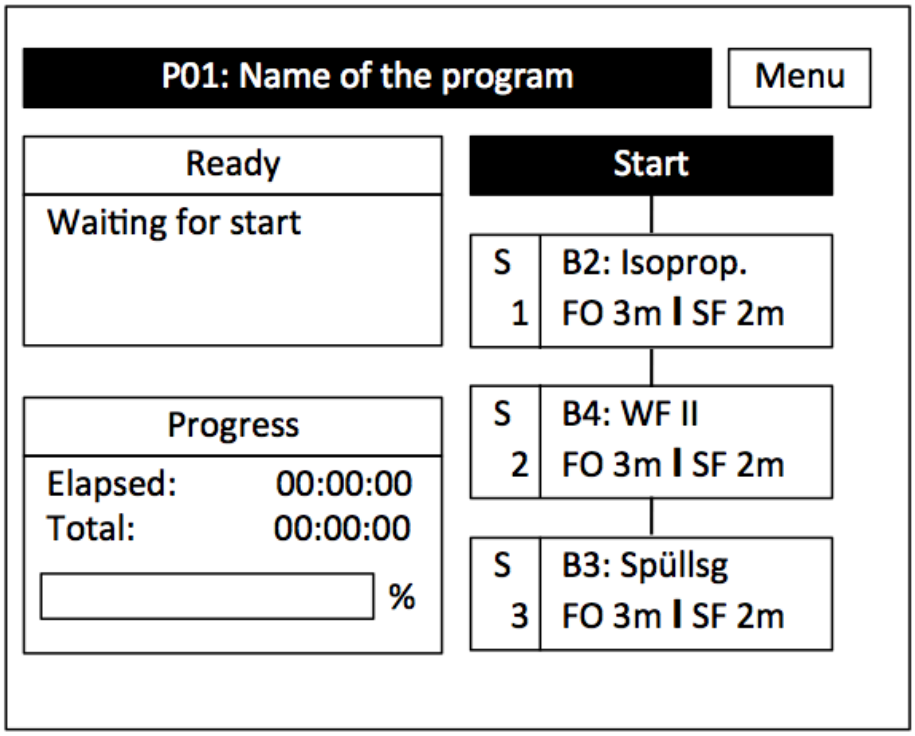
Basically, the machine starts with the last executed or changed cleaning program. To select a different program, turn the ENC until the name of the program is highlighted (or black) and confirm the selection. Here the way to reach the list of programs.



The list of the stored programs is now displayed. To select a program, press on the ENC.

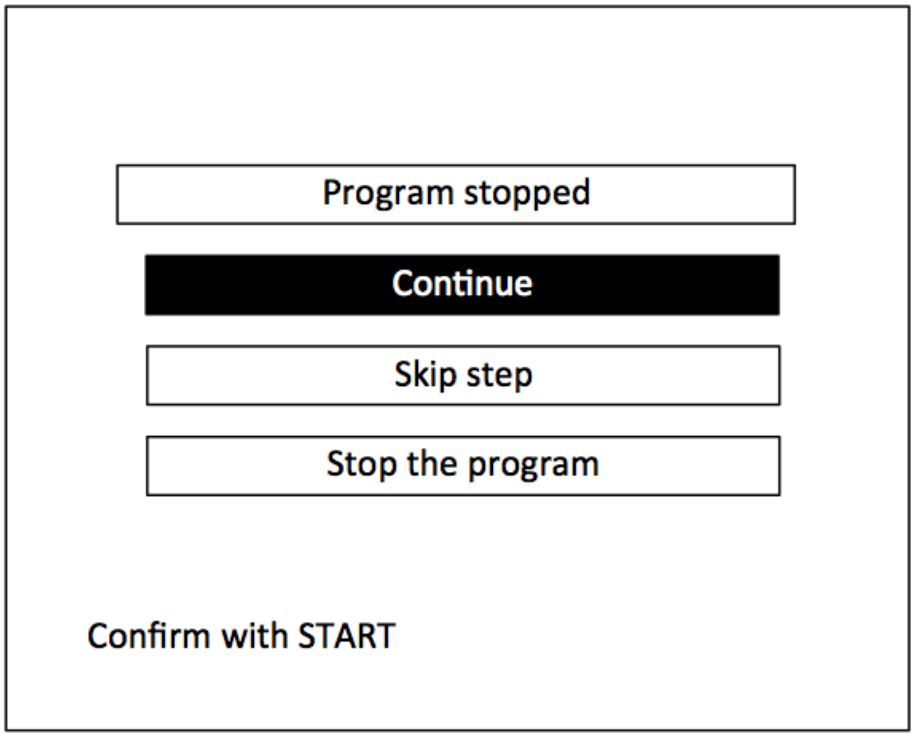


The display shows the program. The cleaning program starts ALWAYS by pressing the Start/Stop button, to prevent accidental starts during the manipulation with the ENC.



Interrupt the cleaning program:

If the Start/Stop button is pressed during an active cleaning program, the machine stops and a selection window appears:



The following options are available:

[Continue] The machine continues the defined program.

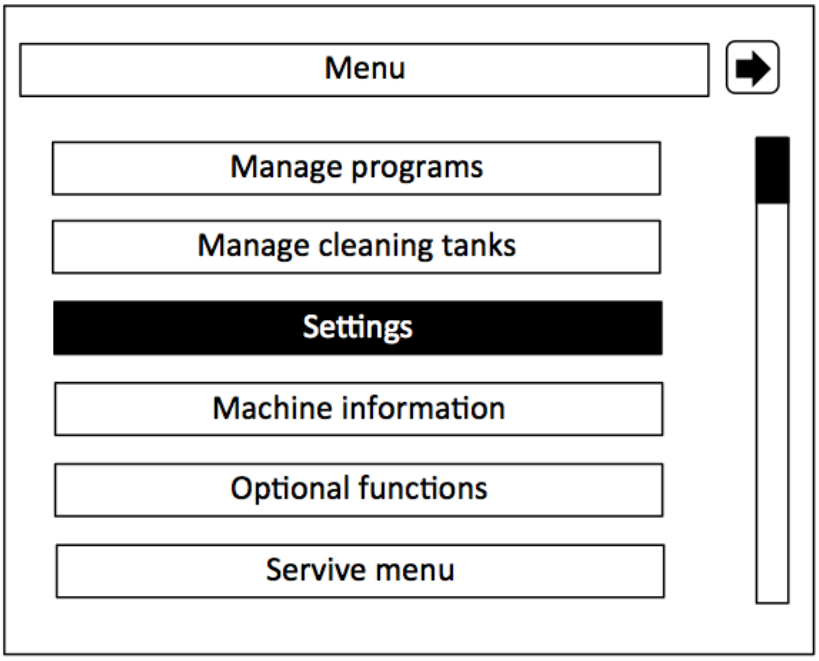
[Skip step] The actually executed step is interrupted and skipped as follow :
The machine automatically detects whether the cleaning basket already had contact with the fluid. In this case, the basket is raised from the fluid and the spinning cycle begins (if programmed) before the next step starts. If the cleaning basket had no contact with the fluid, the spinning movement is skipped and the step begins immediately.

[Stop the program] Aborts the entire program including the steps not achieved. The basket is immediately lifted out from the fluid immediately and it moves back into the Park/Loading position.

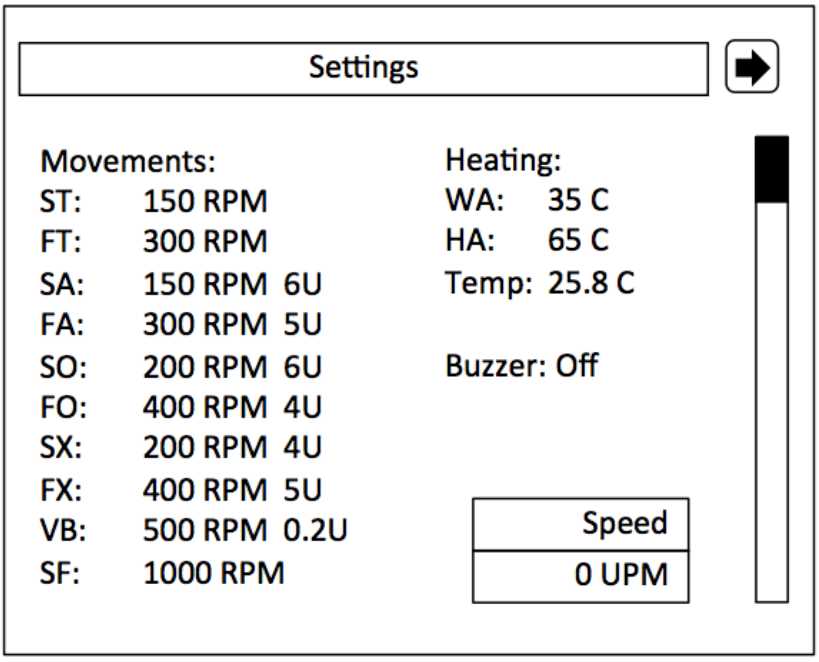
If the door is opened during operation, all movements are stopped and the axle released. The same menu as above appears.

12. Settings

The global parameters of the machine are adjusted in the **"Settings"** menu. (Software V3.x.x).



After choosing **"Settings"** in the main menu, one can adjust the individual rotation speeds of the basket for each bath and the degrees of rotation of the simple movements (if enabled). To try this option, press the [Start/Stop] button.



These speeds have a standard value. By choosing for example 60 RPM for the SO movement, the baskets oscillate 60 RPM each time that the cleaning movement SO is selected.

Abbreviations and meanings of the cleaning movements:

Abbreviation	Movement	Description
ST	Stop	No turning
ST	Slow turning	t/2 to left side, then right
FT	Fast turning	t/2 left side, then right
SA	Slow alternating	n turns left, then n turns right
FA	Fast alternating	n turns left, then n turns right
SO	Slow oscillating	n turns left, then 0,7n turns right
FO	Fast oscillating	n turns left, then 0,7n turns right
SX	Slow extra (osc+ up/down)	n turns left, then 0,7n turns right + up and down
FX	Fast extra (osc+ up/down	n turns left, then 0,7n turns right + up and down
VB	Vibrasonic **(optional)**	n turns left, then 0,7n turns right (fast acceleration – vibrasonic movement)

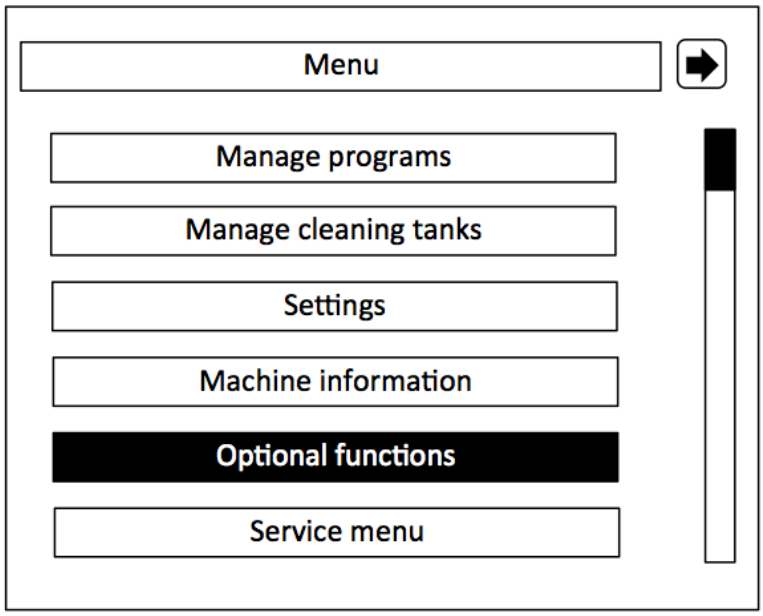
Now, one can globally set the rotation speed for every single movement. For oscillating or changing movements, the optional software also offers the setting for the number of rotations. Otherwise, the factory values will be displayed.

"Heating" : The temperatures for **"WA"** warm air and **"HA"** hot air can be set. Please note that the heating due to the air tube made of stainless steel has certain inertia. By pressing the [**Start/Stop**] button, one can test the heating and directly read the temperature of the air at the sensor.
Please make a test without any pieces, to approach the ideal heating temperature and time to avoid overheating of the pieces to dry.

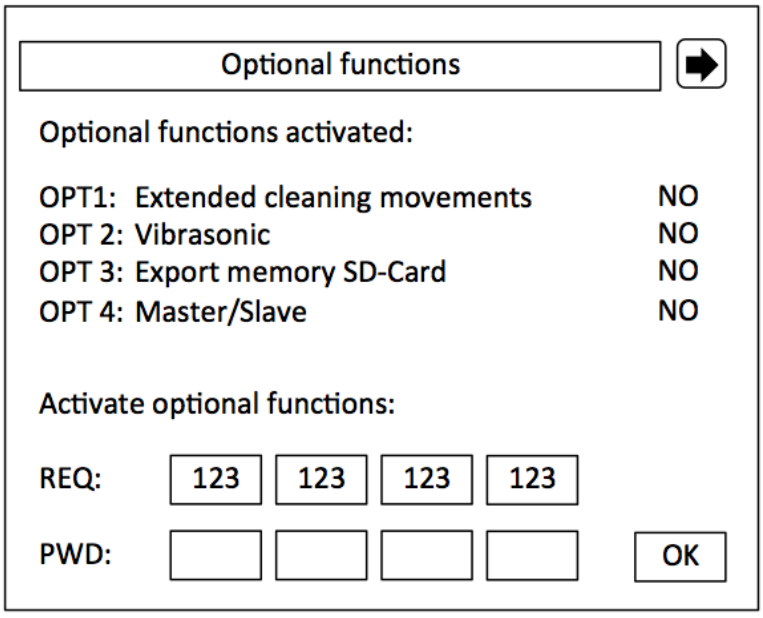
"Buzzer": activate or turn off the confirmation beep emitted by pressing the ENC.

13. Additional functions

Under the **"Additional functions"** menu, unlocking additional functions can be unlocked.



Selecting this menu point, the machine shows the currently unlocked functions. Furthermore, the other functions can be unlocked.



To unlock an optional function, please contact us to get the code.

The machine generates a new request code (REQ) at every single switching on. It is composed of 4 pairs of numbers. With this request code, we generate the password to unlock the additional functions (see page 2).

14. Cleaning and maintenance

Like any watch movement, the mechanics of this machine requires some maintenance.

The guides of the B-axle (vertical movement) are maintenance-free, dry-running polymer bearings and require no maintenance over their lifetime.

The spindle bearing consists of a maintenance-free, dry-running full ceramic bearings, as well as a dry-running Teflon shaft seal ring, which both also don't need any lubrication.

Every 8 weeks :

• The trapezoidal screw that provides the vertical movement of the B-axle has to be controlled and if necessary applied some grease. To do this, we recommend you the spindle grease (reference L1-ZBH003) applied with a bristle brush through the slots in the front panel.
• Check the air filter of the fan heater's air inlet and the control cabinet. If necessary, clean or change it.

The black powder-coated parts of the machine can be cleaned with a soft cloth and some washing-up liquid. **NEVER use solvent-based cleaners**.

Bare stainless steel parts can be cleaned with all commercially available cleaning products and solvents if necessary.

15. Disposal

Do not throw away the machine with the household garbage, but take it to the local collection point as an electrical unit.

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